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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,518	07/29/2003	Sarah J. Liljegren	SALKINS.035C1	4937

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EXAMINER	
BAUM, STUART F	
ART UNIT	**PAPER NUMBER**
1638	

DATE MAILED: 11/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/630,518	LILJEGREN ET AL.	
	Examiner	Art Unit	
	Stuart F. Baum	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *1-7 and 15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/23/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-15 are pending.

2. Applicant's election with traverse of Group II, claims 8-14 in the reply filed on 8/29/2005 is acknowledged. The traversal is on the ground(s) that the claims have been subdivided into an inappropriate number of groups and that it would not be an undue burden to search all of the pending claims at one time (page 4 of Remarks, 2nd paragraph).

This is not found persuasive because Applicants have submitted claims encompassing three distinct groups, and therefore, the restriction requirement reflects the number of inventions that have been submitted in the present application. In addition, while the search of the prior art for one group may overlap with that of another, they are not co-extensive of each other and thus would be a burden on the Office.

Claims 1-7 and 15 have been withdrawn from consideration for being drawn to non-elected inventions.

3. Claims 8-14 are examined in the present office action.

The requirement is still deemed proper and is therefore made FINAL.

Specification

4. Objection is made to the specification for not incorporating SEQ ID NO's when referring to nucleic acid or amino acid sequences. 37 CFR 1.821(d) requires the use of the assigned sequence identifier (e.g. SEQ I.D. NO: X) in all instances where the description or claims of a patent application discuss sequences. In the instant application, Figure 2 comprises five protein

sequences that are each not identified by a sequence identifier, either in the Figure or in the Brief Description of the Drawings. Correction is requested.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 8-10 and 12-14 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to a method of preventing organ loss in a plant, comprising mutating the ARF GAP domain of a gene in said plant.

Applicants disclose mutagenizing a population of Arabidopsis thaliana seeds with ethyl methanesulphonate (EMS) and selecting plants having a phenotype in which floral organ abscission of the sepals, petals and stamens failed to occur throughout the lifetime of the plant (page 29, paragraph 108). This mutant phenotype was called *nevershed*. Using a map based cloning approach, the *nevershed* (*nev*) locus was mapped to chromosome 5 (page 29, paragraph 110). Two mutant alleles were sequenced and are disclosed as SEQ ID NO:5 encoding the *nev-2* mutant polypeptide of SEQ ID NO:6 and SEQ ID NO:3 encoding the *nev-1* mutant polypeptide of SEQ ID NO:4 (page 30, paragraph 112). Applicants disclose an alignment of the putative

ARF GAP domain from the *NEVERSHED* amino acid sequence with ARF GAP domains from other organisms in Figure 2 (page 7, paragraph 24).

Applicants do not identify essential regions of the genus of protein having an ARF GAP domain wherein the protein is involved in organ loss.

The Federal Circuit has recently clarified the application of the written description requirement to inventions in the field of biotechnology. See University of California v. Eli Lilly and Co., 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). In summary, the court stated that a written description of an invention requires a precise definition, one that defines the structural features of the chemical genus that distinguishes it from other chemical structures. A definition by function does not suffice to define the genus because it is only an indication of what the gene does, rather than what it is. The court goes on to say, "A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus."

Applicants fail to describe a representative number of polynucleotide sequences encoding a protein having an ARF GAP domain, wherein the mutant protein is involved in preventing organ loss on the plant. Applicants only describe two alleles of the same genomic sequence from Arabidopsis of SEQ ID NO:3 and 5. Furthermore, Applicants fail to describe structural features common to members of the claimed genus of polynucleotides. Hence, Applicants fail to meet either prong of the two-prong test set forth by *Eli Lilly*. Furthermore, given the lack of description of the necessary elements essential for the protein comprising an ARF GAP domain,

in which the protein is involved in organ abscission, it remains unclear what features identify said protein. Since the genus of proteins having an ARF GAP domain and that are involved in organ abscission has not been described by specific structural features, the specification fails to provide an adequate written description to support the breath of the claims.

Scope of Enablement

6. Claims 8-14 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of preventing organ loss in a plant, wherein said organ is sepal, petal and/or stamens, comprising mutating the ARF GAP domain of a gene in said plant, wherein the nucleotide sequence of said gene comprises SEQ ID NO:1, does not reasonably provide enablement for a method of preventing organ loss in any plant comprising mutating the ARF GAP domain of any gene in said plant. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claimed invention is not supported by an enabling disclosure taking into account the *Wands* factors. *In re Wands,* 858/F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). *In re Wands* lists a number of factors for determining whether or not undue experimentation would be required by one skilled in the art to make and/or use the invention. These factors are: the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples of the invention, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claim.

The claims are drawn to a method of preventing organ loss in a plant, comprising mutating the ARF GAP domain of a gene in said plant, or wherein said organ loss is floral organ loss.

Applicants disclose mutagenizing a population of Arabidopsis thaliana seeds with ethyl methanesulphonate (EMS) and selecting plants having a phenotype in which floral organ abscission of the sepals, petals and stamens failed to occur throughout the lifetime of the plant (page 29, paragraph 108). This mutant phenotype was called *nevershed.* Using a map based cloning approach, the *nevershed* (*nev*) locus was mapped to chromosome 5 (page 29, paragraph 110). Two mutant alleles were sequenced and are disclosed as SEQ ID NO:5 encoding the *nev-2* mutant polypeptide of SEQ ID NO:6 and SEQ ID NO:3 encoding the *nev-1* mutant polypeptide of SEQ ID NO:4 (page 30, paragraph 112). Applicants disclose an alignment of the putative ARF GAP domain from the *NEVERSHED* amino acid sequence with ARF GAP domains from other organisms in Figure 2 (page 7, paragraph 24).

Applicants' claims are drawn to a method of preventing any organ loss in any plant, comprising mutating the ARF GAP domain of any gene in said plant. Applicants have not disclosed other proteins comprising an ARF GAP domain that can be mutated to produce the desired phenotype, other than mutating the nucleotide sequence of SEQ ID NO:1. Applicants have also not disclosed preventing any organ loss, other than preventing sepals, petals and stamens from abscissing by mutating SEQ ID NO:1. The state-of-the-art teaches that not all proteins comprising an ARF GAP domain are involved in organ abscission, especially sepal, petal, and stamen abscission. Zhuang et al (2005, Plant, Cell and Environment 28(2):147-156)

teach the OsAGAP protein, an ARF GAP protein from rice, is involved in the mediation of plant root development by regulating auxin level (abstract).

Applicants have not taught one skilled in the art, how to identify proteins having an ARF GAP domain that can be mutated to produce plants in which the organs are prevented from abscissing. Applicants have not disclosed other ARF GAP domain proteins, either from Arabidopsis or from any other plant, that can be mutated to produce the desired result. The state-of-the-art teaches that other regions of an ARF GAP protein are also important for the proper activity of the protein. Jensen et al (2000, Plant Molecular Biology 44:799-814) states "Recently, the crystal structure of ARF GAP domains from two different proteins, ARF1 GAP and PAPβ have been determined. The structures are similar for a highly conserved core region, but differ in flanking regions, also of importance for activity" (page 800, right column, bottom of top paragraph). Jensen et al concludes by stating that the linker region between the ARF GAP and C2 domains from an Arabidopsis ARF GAP protein, binds phosphatidylinositol 3-monophosphate, which facilitates ARF-mediated vesicular transport (*ibid*).

In the absence of guidance, undue trial and error experimentation would be required for one of ordinary skill in the art to mutagenize a population of seeds from any plant, screen the plants for a phenotype in which any plant organs do not abscisse, and then to isolate the gene that is mutated using non-exemplified sequences of SEQ ID NO:1 as a probe or by designing primers to non-disclosed regions of SEQ ID NO:1, and isolating or amplifying fragments, subcloning the fragments, and producing a predicted polypeptide sequence that comprises an ARF GAP domain identical with the predicted ARF GAP domain of Applicants' NEVERSHED protein, in order to

identify those if any, that when mutated produce a plant whose organs are prevented from abscissing .

Therefore, given the breadth of the claims; the lack of guidance and examples; the unpredictability in the art; and the state-of-the-art as discussed above, undue experimentation would be required to practice the claimed invention, and therefore the invention is not enabled.

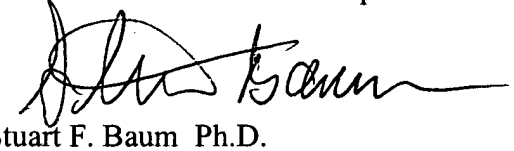
7. Claims 8-14 are deemed free of the prior art, given the failure of the prior art to teach or reasonably suggest a method of preventing organ loss in a plant, comprising mutating the ARF GAP domain of a gene in said plant, or wherein said gene comprises the nucleotide sequence of SEQ ID NO:1.

8. No claims are allowed.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stuart F. Baum whose telephone number is 571-272-0792. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones can be reached on 571-272-0745. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.



Stuart F. Baum Ph.D.
Patent Examiner
Art Unit 1638
October 31, 2005